

From: [Rush, Randall](#)
To: [Lucas Gregory](#); [David Villarreal](#); [Weiler, Gregory](#); [Foster, Nichole](#); [Bira, Mike](#); [Thilsted, Eugene](#); [Smith, Monica](#); [Smalley, Bryant](#); [Carroll, Craig](#); [Restivo, Angela](#); [TJ Heflon](#)
Cc: [Dale Scott](#); [Kerry Niemann](#); [lbhairgrove@tamu.edu](#); [lbhairst@usda.gov](#); [chris.harper@fwg.gov](#); [michael.j.bodenchuk@aphis.usda.gov](#); [Crocker, Philip](#); [Hosch, Claudia](#); [Honker, William](#); [Cook, Robert](#); [Nelson, Russell](#)
Subject: RE: Information -- acceptable TDS levels for livestock use & Request for monitoring supplies
Date: Friday, September 1, 2017 2:19:20 PM
Attachments: [image001.png](#)
[image002.jpg](#)

First, please forward this to appropriate officials at Texas Animal Health Commission (TAHC) and State Operations Center that made initial request for salinity monitoring equipment. Second, I have copied all parties that have provided additional information along the way. In summation, within this email group exchange Texas AgriLife has offered some conductivity meters that can be borrowed. Lucas Gregory is contacting Drs. Hairgrove and Paschal. In addition, USDA-NRCS has mentioned to one of our EPA On-Scene Coordinators that they have about a dozen instruments that can be used. Here is the contact information for the NRCS staff member with those details. Alan Stahnke, State Soil Scientist, is the POC for this matter. Alan's contact information is Alan.Stahnke@tx.usda.gov and cell phone no. is 245-913-3029. Office no. is 254-742-9857. So if TAHC or State Operation Center officials want to contact Mr. Stahnke directly to access these meters, please do so.

One last item to close the information loop on using conductivity meters in lieu of salinity probes. Conductivity meters measure a unit of conductivity where as a salinity probe measures total dissolved solids (TDS). Our guidelines for water use for agriculture purposes is expressed in TDS. So one would need to convert conductivity meter readings to TDS, which is explained below. Though I'm sure most of you already know this.

The unit of measurement for conductivity is expressed in either microSiemens (S/cm) or (uS/cm) or micromhos (umho/cm) which is the reciprocal of the unit of resistance, the ohm.

Since in some cases conductivity meters will be used in lieu of salinity probes, one needs to know how to convert conductivity reading (shown as uS/cm, S/cm, umho/cm depending on the equipment) to (mg/l or parts per million) that the TDS guideline is set as (see chart below).

Here is a link for converting such information.

Conductivity can easily be converted to TDS (mg/l units (aka parts per million)). You can use the following link.

<http://www.chemiasoft.com/chemd/TDS>

Therefore, according to guidelines below, safe levels for TDS for all livestock (cattle/Poultry) uses is a max of 2,999 parts per million. According to conversion calculator a conductivity reading of 5295 uS/cm is just under 2,999 parts per million (ppm).

According to guideline satisfactory use level for cattle is a max level of 5,000 ppm. Not healthy for poultry though. This converts to a max conductivity reading of 8,715 uS/cm.

Marginal use max is 7,000 ppm, which equals 12,075 uS/cm.

Above 7000ppm the chart says avoid use if possible.

Absolutely do not use if 10,000 ppm or 17,025 uS/cm

Further information for use. The following link and screen shot are from OSU but based on EPA's standards of safe salinity levels in water for livestock use. I'm sure TAMU has similar information as does TCEQ. Keep in mind this standard is for Total Dissolved Solids (TDS) which is a measure for salinity. Very glad Lucas and TX AgriLife will be able to provide some conductance meters. Thanks.

<http://pods.dasn.okstate.edu/docushare/dsweb/Get/Document-7406/L-256%20Final%203-24-11.pdf>

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Randy Rush
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"Ua Mau ke Ea o ka 'Aina i ka Pono"

The life of the land is perpetuated in righteousness

From: Rush, Randall

Sent: Friday, September 01, 2017 11:18 AM

To: 'Lucas Gregory'; David Villarreal; Weiler, Gregory; Foster, Nichole; Bira, Mike; Thilsted, Eugene

Cc: Dale Scott; Kerry Niemann

Subject: Information -- acceptable TDS levels for livestock use

Further information for use. The following link and screen shot are from OSU but based on EPA's standards of safe salinity levels in water for livestock use. I'm sure TAMU has similar information as does TCEQ. Keep in mind this standard is for Total Dissolved Solids (TDS) which is a measure for salinity. Very glad Lucas and TX AgriLife will be able to provide some conductance meters. Thanks. <http://pods.dasn.okstate.edu/docushare/dsweb/Get/Document-7406/L-256%20Final%203-24-11.pdf>

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"*Ua Mau ke Ea o ka 'Aina i ka Pono*"

The life of the land is perpetuated in righteousness

From: Lucas Gregory [<mailto:lfgregory@ag.tamu.edu>]

Sent: Friday, September 01, 2017 9:47 AM

To: Rush, Randall <Rush.Randall@epa.gov>; David Villarreal <David.Villarreal@TexasAgriculture.gov>; Weiler, Gregory <weiler.gregory@epa.gov>; Foster, Nichole <Foster.Nichole@epa.gov>; Bira, Mike <Bira.Mike@epa.gov>;

Thilsted, Eugene <Thilsted.Eugene@epa.gov>

Cc: Dale Scott <Dale.Scott@TexasAgriculture.gov>; Kerry Niemann <Kerry.Niemann@tceq.texas.gov>; Hosch, Claudia <hosch.claudia@epa.gov>

Subject: RE: Salinity test kits or instrumentation

Thanks Randy and David,

We do not have any specific salinity probes or test kits. The closest we have are some specific conductance meters that are the small handheld type. I will contact Drs. Hairgrove and Paschal directly to see if they will work.

Y'all have a great weekend,

Lucas

From: Rush, Randall [<mailto:Rush.Randall@epa.gov>]

Sent: Friday, September 01, 2017 9:15 AM

To: David Villarreal <David.Villarreal@TexasAgriculture.gov>; Weiler, Gregory <weiler.gregory@epa.gov>; Foster, Nichole <Foster.Nichole@epa.gov>; Bira, Mike <Bira.Mike@epa.gov>; Thilsted, Eugene

<Thilsted.Eugene@epa.gov>

Cc: Dale Scott <Dale.Scott@TexasAgriculture.gov>; Kerry Niemann <Kerry.Niemann@tceq.texas.gov>; Lucas Gregory <lfgregory@ag.tamu.edu>; Hosch, Claudia <hosch.claudia@epa.gov>

Subject: RE: Salinity test kits or instrumentation

You as well David.

It has occurred to me we had provided water quality monitoring equipment to TAMU, Texas AgriLife, for monitoring projects they implement but likely these are sysco samplers rather than salinity probes. Plus not sure if any are not already used or perhaps lost in the hurricane aftermath. I have copied our POC for AgriLife, Lucas Gregory, in case he has further information. We have done the same with TCEQ. So I have copied our POC for TCEQ, Kerry Niemann.

Lucas and Kerry, TDA is looking for salinity probes for use to determine if surface water resources or tanks can be used for agricultural purposes & livestock in the hurricane impact zone.

Randy Rush

Policy Advisor - Agriculture

U.S. EPA - Region 6

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From: David Villarreal [<mailto:David.Villarreal@TexasAgriculture.gov>]

Sent: Friday, September 01, 2017 7:13 AM

To: Rush, Randall <Rush.Randall@epa.gov>; Weiler, Gregory <weiler.gregory@epa.gov>; Foster, Nichole <Foster.Nichole@epa.gov>; Bira, Mike <Bira.Mike@epa.gov>; Thilsted, Eugene <Thilsted.Eugene@epa.gov>

Cc: Dale Scott <Dale.Scott@TexasAgriculture.gov>

Subject: RE: Salinity test kits or instrumentation

Thanks Randy and Greg and everyone. We appreciate all the help and info.....have a restful long weekend.....David

David T. Villarreal, Ph.D.

Environmental Specialist

Environmental Toxicology, Endangered Species,

Agricultural Microbiology and Water Quality

Environmental and Biosecurity Program

Texas Department of Agriculture

david.villarreal@texasagriculture.gov

From: Rush, Randall [Rush.Randall@epa.gov]

Sent: Thursday, August 31, 2017 3:16 PM

To: Weiler, Gregory; Foster, Nichole; Bira, Mike; Thilsted, Eugene

Cc: Dale Scott; David Villarreal

Subject: RE: Salinity test kits or instrumentation

David and Dale,
I had given a short briefing to our Regional senior leadership yesterday on ag status post hurricane, based on reports I had gathered. They asked I keep our emergency response team informed. I will forward your request to the lead on-scene coordinator for EPA's emergency response. I do know all the salinity kits we had were being deployed in the Bird Creek watershed in Osage County Oklahoma for follow-up data gathering from incidents up there that were affecting watering resources for range cattle.

Randy Rush

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"*Ua Mau ke Ea o ka 'Aina i ka Pono*"

The life of the land is perpetuated in righteousness

From: Weiler, Gregory

Sent: Thursday, August 31, 2017 2:51 PM

To: Foster, Nichole <Foster.Nichole@epa.gov>; Bira, Mike <Bira.Mike@epa.gov>; Rush, Randall <Rush.Randall@epa.gov>; Thilsted, Eugene <Thilsted.Eugene@epa.gov>

Cc: Dale Scott <Dale.Scott@TexasAgriculture.gov>; David Villarreal <David.Villarreal@TexasAgriculture.gov>

Subject: FW: Salinity test kits or instrumentation

Any one know who can help in this effort below?? Let David Villarreal know at TDA if you can....thanks.....

Greg Weiler

US EPA Region 6 Pesticides Section

1445 Ross Avenue, Dallas, Texas 75202

Phone: 214-665-7564.

Email: weiler.gregory@epa.gov

From: David Villarreal [<mailto:David.Villarreal@TexasAgriculture.gov>]

Sent: Thursday, August 31, 2017 10:22 AM

To: Lynne Fahlquist <lfahlquist@usgs.gov>; Weiler, Gregory <weiler.gregory@epa.gov>; Harper, Chris <chris_harper@fws.gov> <chris_harper@fws.gov>; Michael Bodenchuk <michael.j.bodenchuk@aphis.usda.gov>

Subject: Salinity test kits or instrumentation

Texas A&M and the TAHC need field testing of waters to make sure they are safe for livestock because of Hurricane Harvey. We are working on this internally, but wanted to extend the request in case one of your agencies can help as well. Please let me know ASAP. David

David T. Villarreal, Ph.D.

Environmental Specialist

Environmental Toxicology, Endangered Species,

Agricultural Microbiology and Water Quality

Environmental and Biosecurity Program

Texas Department of Agriculture

david.villarreal@texasagriculture.gov



From: Hairgrove Sr, Thomas B [<mailto:tbhairgrove@tamu.edu>]

Sent: Thursday, August 31, 2017 10:06 AM

To: David Villarreal; Joe Paschal; Hairgrove Sr, Thomas B

Subject: Salinity test kits

David,

This is test to make sure have each other's emails.
I have copied Dr Paschal
Tom
Thomas B. Hairgrove
Associate Professor and Extension Specialist
Texas A&M AgriLife Extension Service
241 D Kleberg, TAMU 2471
College Station, Texas 77843
Office 979 458 3216
Cell 979 571 9833

UNDERSTANDING YOUR WATER TEST REPORT

Water used by livestock will occasionally contain elements or substances at levels that may reduce performance or cause toxicity. The source of the contaminants may be natural or man-made. In either case, if you suspect your water supply is harming your livestock, the first step in diagnosing the problem is to collect a representative water sample and submit it to your County Extension office for a livestock water test.

What Do the TEST RESULTS MEAN?

The OSU Soil, Water and Forage Analytical Laboratory tests livestock water samples for pH, total soluble solids, electrical conductivity, nitrate-nitrogen, sulfate, and concentrations of major elements. A summary of major tests follow.

The pH reflects the acidity or alkalinity of the water. A pH of 7 is neutral. A pH value below 7 is acid, and a pH value above 7 is alkaline. It is preferred that the water has a pH between 6.0 and 8.5, but most animals can tolerate water slightly outside of this range (5.5-9).

Total dissolved solids (TDS) refer to salt particles that are dissolved in a water sample. Salt particles include the substances that form common table salt (sodium and chloride) as well as calcium, magnesium, potassium, sulfate, nitrate, and carbonate. When salts mix with water, they dissolve into ions that have positive and negative electrical charges. As the amount of dissolved salt increases, the number of charged ions increases, and the ability of the water to conduct electricity becomes greater. As a result, the amount of TDS in a water sample can be estimated by measuring the electrical conductivity (EC) of the sample. Table 1 presents guidelines for interpreting TDS test results and determining the associated livestock risks.

TABLE 1. GUIDELINES FOR INTERPRETING LIVESTOCK AND POULTRY WATER TEST RESULTS FOR TOTAL DISSOLVED SOLIDS.

Total Dissolved Solids Content (ppm)	Interpretation
<1,000	Considered low. Excellent for all classes of livestock and poultry.
1,000-2,999	Very satisfactory but may cause a mild temporary diarrhea in animals not accustomed to the water.
3,000-4,999	Satisfactory for livestock; poor water for poultry, especially turkeys. Water may be refused when first offered to animals or cause temporary diarrhea.
5,000-6,999	Marginal quality for livestock. Avoid these waters for pregnant or lactating animals. Not suitable for poultry.
7,000-10,000	Avoid use for all animals if possible. Considerable risk for pregnant or lactating animals. Older animals may be tolerant under less stressful conditions.
>10,000	Unsafe. Avoid under all conditions.

ppm=parts per million

National Research Council. 1974. *Nutrients and Toxic Substances in Water for Livestock and Poultry*. Washington D.C., National Academy of Sciences.

For more information on understanding your livestock and poultry water test, please consult your local OSU County Extension Office.

Nitrates are a salt that can be particularly harmful to livestock, and are therefore included in the livestock water test. Table 2 presents guidelines for interpreting nitrate-nitrogen test results and determining the associated livestock risks. In some cases, the nitrate content of feed and forage should also be considered when assessing the risk of nitrates in water.

Mineral concentrations are also important water quality parameters for poultry and livestock. The upper limits of tested and selected untested minerals are listed in Table 3. For more details of interpretations for livestock water quality, please use the online interactive program at <http://soiltesting.okstate.edu/water-test-interpretation-program>

TABLE 2. GUIDELINES FOR INTERPRETING LIVESTOCK AND POULTRY WATER TEST RESULTS FOR NITRATE-NITROGEN.

NO ₃ (ppm)	NO ₃ -N (ppm)	Comment
0-44	0-10	Safe for consumption by livestock and poultry.
45-132	10-20	Generally safe in balanced diets with low nitrate feeds.
133-220	20-40	Could be harmful if consumed over long periods.
221-660	40-100	Animals at risk. Potential death losses.
661-800	100-200	Unsafe. High potential for death losses.

National Research Council. 2001. *Nutrient Requirements of Dairy Cattle*, 7th revised edition. Washington D.C., National Academy of Sciences.



COLLECTING A PROPER WATER SAMPLE

Use a clean 4 oz. plastic container to collect your water sample. Plastic bottles can be obtained from your County Extension office. Prior to filling the bottle, rinse it three times with the water to be tested. Try and leave as little air as possible in the bottle after collecting the sample. Make sure the sample is representative of the water being consumed by the livestock. If contamination of an isolated water supply is suspected, it is best to also collect and submit a water sample from a nearby supply that is known to be uncontaminated.